

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Status of the Claims

Claims 1, 3, 11, 13, 15, 19, 23 and 24 are currently being amended. Claims 25-27 are being added. No new matter is added. Claims 2, 14, 21 and 22 are requested to be cancelled without prejudice or disclaimer.

Claim Rejection Under 103(a)

Claims 1-8 and 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi et al. (U.S. Patent No. 6,632,776) in view of Snitchler et al. (U.S. Patent No. 6,393,690). This rejection is respectfully traversed.

As amended claims 1, 11, 13 and 19 recite, among other features, a method of manufacturing an oxide superconducting wire, including the speed of said pressurization is at least 0.05 MPa/min. Subject matter of claim 2 is incorporated in claims 1, 11 and 19. Subject matter of claim 14 is incorporated in claim 14.

As will be discussed in greater detail below, Kobayahsi et al., Snitchler et al., Jin et al. (U.S. Patent No. 4,952,554) and Hikata et al. (U.S. Patent No. 5,236,891), alone or in combination fail to teach at least the above recited features.

Unexpected improvements including higher sintering densities may be realized by using the methods of claims 1, 11, 13 and 19, compared to other methods in the references of record. In particular, gas penetration through pinholes in the metal can create blisters and voids in the oxide superconductor. (Original Specification, page 2, line 22-page 3, line 2) The blisters and voids disadvantageously reduce the critical current density of the oxide superconductor. (Original specification, page 2, line 27). The methods of claims 1, 11, 13 and 19 increase critical current density by increasing the sintering density by preventing the gas penetration of pinholes in the metal during heat-up time before heat treatment.

Embodiments of the invention relate to processes for achieving a higher sintering density by first, achieving 0.2% yield strength of the metal such that the metal is readily

compressible through compressive force from atmospheric pressurization. (Original Specification, page 4, lines 3-7) Second, by increasing the pressure at the speed of at least 0.05 MPa/minute at the heat-up time before the heat treatment, sufficient compressive force may be applied on the compressible metal to prevent gas penetration through pinholes in the oxide superconductor wire (Original Specification page, 4, line 25 – page 5, line 4).

Therefore, a method as claimed including a combination of 1) pressurization is started from a temperature reducing 0.2 % yield strength of said metal at a heat-up time before the heat treatment in said heat treatment step and then 2) increasing the pressure at the speed of at least 0.5 MPa/minute at the heat-up time before the heat treatment, can provide higher sintering densities.

Each of the cited references fail to teach or suggest a method of claims 1, 11, 13 and 19 including at least the above recited features. With regard to the above features, paragraph 9 of the Office Action dated August 17, 2009, states:

It would have been obvious to a person ordinarily skilled in the art at the time of the invention to modify the teachings of Kobayashi in view of Snitchler to make the speed of pressurization at least 0.05 or 0.1 MPa/minute, as required by claims 2, 3, 14 and 15. One would have been motivated to make this modification because increasing the pressure at a slower rate than 0.05 MPa/minute would make the process take longer that it would increasing the pressure at a faster rate. It is well settled that determination of optimum values of cause effective variables such as the rate of pressure increase is within the skill of one practicing in the art. *In re boesch*, 205 USPQ 215 (CCPA 1980)

However, as discussed above, substantial unexpected improvements are available according to the claimed method. Such unexpected improvements in sintering density would not be achieved by optimizing values of Kobayashi et al. or Snitchler et al. If such results would have been obvious from simply selected optimum values, then certainly those working in the filed would have achieved those advantages. Neither Kobayashi et al. or Snitchler et al. mention such advantages is evidence that the claimed method would not have been obvious. The features of the claims require increasing the pressurization at least the speed of 0.5 MPa/min when the metal can be affected by compressive forces, whereas the references of record fail to teach or suggest increasing the pressurization or metal affected by compressive

force. Kobayashi et al., Snitchler et al., Jin et al. and Hikata et al., alone or in combination fail to teach or suggest at least the above recited features of claims 1, 11, 13 and 19.

In particular, Kobayashi et al. teach, “the total pressure of the pressurized atmosphere is kept at least 0.5 MPa in the starting point of the heat treatment within the temperature region of less than 100 °C as well as in the end point of the heat treatment reaching the temperature region below the heat treatment temperature.” (Column 5, lines 15-21) Kobayashi et al. fail to teach increasing the pressurization at any rate, i.e. 0.5 MPa/min. Instead, Kobayashi et al. teach maintaining a particular pressure, i.e. at least 0.5 MPa. Moreover, Kobayashi et al. teach pressurizing atmosphere in the range of 0.1 MPa to 20 MPa, where the pressure is held at a particular value for 50 hours. (See e.g. Kobayashi et al., Table 1) Moreover, the pressure referred to in Kobayashi et al. is the pressure during the heat treatment whereas the present claims refer to the speed of pressurization during heat up time before the heat treatment. Furthermore, Kobayashi requires that the wire is rolled after the heat treatment to reduce the density whereas present claim 7 recites no rolling occurs. Therefore, Kobayashi et al. fail to teach or suggest at least the above recited features of claims 1, 11, 13 and 19 and dependent claim 7.

Snitchler et al. fail to teach or suggest at least the above recited features of claims 1, 11, 13 and 19. Instead, Snitchler et al. disclose a high pressure oxidation treatment at 500 °C for 20 hours at 100 atm. (Column 15 lines 55-62) Thus Snitchler et al. disclose maintaining the pressure of the atmosphere at 100 atm for 20 hours. Snitchler et al. do not teach increasing the pressure at the speed of at least 0.5 MPa/minute after the metal achieves a 0.2 % yield strength or pressurizing before the heat treatment. Therefore, Snitchler et al. do not address the above noted distinctions between the claims and Kobayashi et al. Accordingly, the Examiner’s proposed combination of Kobayashi et al. and Snitchler et al. fails to teach at least the above recited features of claims 1, 11, 13 and 19.

Hikata et al. discloses heat treating the raw material powder under a reduced pressure of not more than 1 atm, immediately before filling the powder into a metal sheath and thereafter heat treating the same under an oxygen atmosphere. (Column 1, lines 14-17) Jin et al. disclose a sintering step carried out at a “relatively high pressure of 1.5 – 20 atm with a slow cool.” (Column 7, lines 25-32) Each of Hikata et al. and Jin et al. fail to teach or suggest increasing the pressure at the speed of at least 0.5 MPa/minute after getting the metal

to a 0.2 % yield strength or pressurizing before the heat treatment. Therefore, Hikata et al. or Jin et al, alone or in combination, do not address the above noted distinctions between the claims and Kobayashi et al. and Snitchler et al. Accordingly, Kobayashi et al., Snitchler et al., Hikata et al. and Jin et al., alone or in combination, fail to teach at least the above recited features of claims 1, 11, 13 and 19.

Therefore claims 1, 11, 13 and 19 are believed to be allowable. Because claims 3-10, 23 and 24 depend from claim 1, they are believed to be allowable for at least the same reasons claim 1 is believed to be allowable. Because claim 12 depends from claim 11, it is believed to be allowable at least the same reasons claim 11 is believed to be allowable. Because claims 15, 16, 17 and 18 depend from claim 13, they are believed to be allowable for at least the same reasons claim 13 is believed to be allowable. Because claim 20 depends from claim 19, it is believed to be allowable at least the same reasons claim 20 is believed to be allowable.

Claim Objection Regarding Claim 23 and 24

On page 7 of the Office Action dated August 17, 2009 claims 23 and 24 were objected to for being improper dependent claims. Claims 23 and 24 are amended to be in proper dependent form. Claims 23 and 24 recite, “The method of manufacturing an oxide superconducting wire,” as suggested by the Examiner on page 7 lines 8-14 of the Office Action dated August 17, 2009. Thus it is respectfully requested that the objection be withdrawn.

New Claims

New claims 25-27 are added to further protect aspects of the present invention. New claims 25-27 are supported by the present disclosure, at least with respect to claims 25-27 (Page 24, lines 5-28, Figs. 12) New claims 25-27 are each dependent on independent claim 1. Accordingly, each of the new claims 25-27 are patentably distinguishable over the references of record, at least for reasons as discussed above with respect to claim 1. In addition each new claim 25-27 is further distinguished from the references of record.

For example, new claim 25 is dependent on claim 1, and incorporates every features of claim 1 and further recites, the speed of said pressurization is increased at least 0.05

MPa/min until the pressure of 50 MPa is reached. As discussed above with regarding to claim 1, the references of record fail to teach pressurizing at the speed of 0.05 MPa/min until the pressure of 50 MPa is reached. At most, the Kobayashi et al. teach a pressure of up to 20 MPa. (Table 1) Therefore claim 25 is believed to be allowable.

For example, new claim 26 is dependent on claim 1, and incorporates every features of claim 1 and further recites, the pressurization inhibits gas penetration in pinholes in the metal during heat-up time before heat treatment. As discussed above with regarding to claim 1, the references of record fail to teach or suggest the pressure inside the superconducting wire. Therefore claim 26 is believed to be allowable.

For example, new claim 27 is dependent on claim 1, and incorporates every features of claim 1 and further recites, the pressure of the atmosphere at heat-up time is continuously increased at a rate of at least 0.05 MPa/min such that the pressure of the atmosphere is maintained higher than a pressure inside the superconducting wire. As discussed above with regarding to claim 1, the references of record fail to teach or suggest the pressure inside the superconducting wire. Therefore claim 27 is believed to be allowable.

Concluding Remarks

After amending the claims as set forth above, claims 1, 3, 4-13, 15-19 and 23-27 are pending in this application.

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under

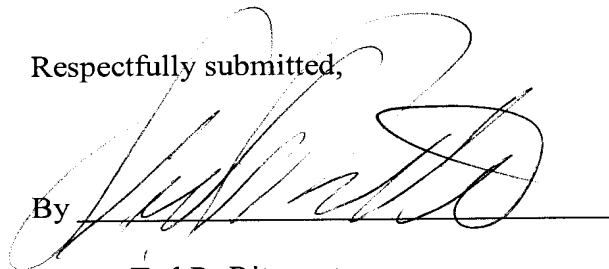
37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date

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